National Aeronautics and Space Administration

NASAfacts

Forging Future Flight: Aeronautics Research at the NASA Langley Research Center

(Aviation Safety Research – System-Wide Safety and Assurance Technologies)

The NASA Langley Research Center (LaRC)

Located in Hampton, VA, LaRC was established as the nation's first civilian-led aeronautics research laboratory in 1917. NASA Langley serves as a world leader in "cutting edge" aeronautics research. Approximately $180 million was invested in aeronautics research at LaRC (2011). In 2010 NASA Langley contributed $946.8 million to the Virginia economy while supporting 8,624 jobs in the state of Virginia. In the Hampton Roads area in 2010, Langley contributed $886.7 million to the local economy while supporting 7,962 jobs.

Aeronautics Research Directorate (ARD)

The ARD at NASA LaRC manages projects that support four programs: (1) Integrated System Research Program, (2) Fundamental Aeronautics Program, (3) Aviation Safety Program, and (4) Airspace Systems Program. Research activities are performed under the specific projects described later. The NASA LaRC ARD facilitates external partnerships to complement the agency's aeronautics mission.

Aviation Safety Program (AvSP)

Objectives of AvSP:

- Proactively identify, develop, and mature tools, methods,and technologies for improving overall aircraft safety of new and legacy vehicles operating in NextGen (AvSP goal).
- Provide knowledge, concepts, and methods to proactively manage increasing complexity in the design and operation of vehicles and the air transportation systems (System-Wide Safety and Assurance Technologies Project).
- Identify risks and provide knowledge needed to avoid, detect, mitigate, and recover from hazardous flight conditions, and to maintain vehicle airworthiness and health (Vehicle Systems Safety Technologies Project).
- Investigate sources of risk and provide technology needed to help ensure safe flight in and around atmospheric hazards (Atmospheric Environment Safety Technologies Project).

System-Wide Safety and Assurance Technologies (SSAT) Project (Aviation Safety Program)

This Ames Research Center (ARC)-led project integrates work at LaRC, Glenn Research Center (GRC), and ARC. The work at LaRC includes: (1) the investigating techniques for safe, rapid, and cost-effective NextGen Systems using a unified safety assurance process for ground-based and airborne systems; (2) increasing the safety of human-automation interaction by incorporating human performance considerations throughout the design lifecycle in NextGen technologies; and (3) pursuing the development of verifiable prognostic algorithms to help remove obstacles to certification.

Primary Goal: Develop validated multidisciplinary tools and techniques to ensure system safety in NextGen to enable proactive management of safety risk through predictive methods.

Technical Challenges:

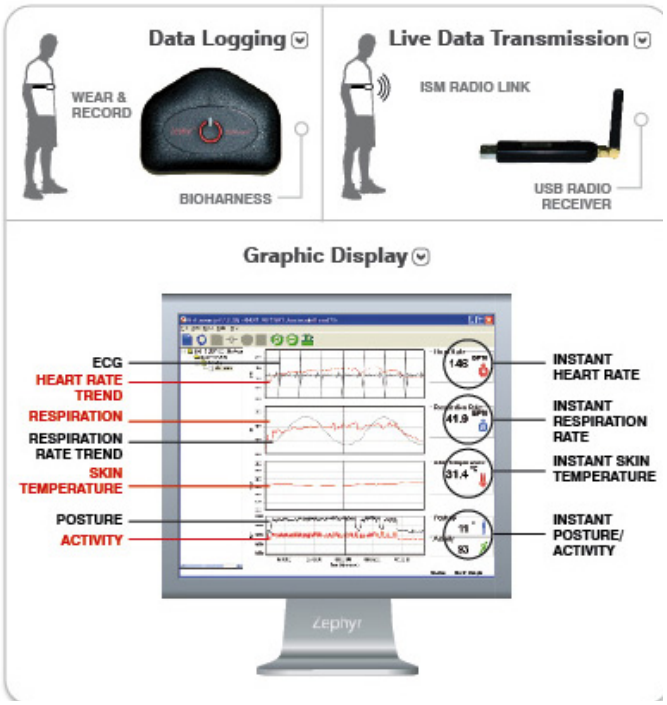
- Development of safe, rapid, and cost-effective NextGen systems using a unified safety assurance process for ground-based and airborne systems.
- Automated discovery of previously unknown precursors to aviation safety incidents in massive (>10 TB) heterogeneous data sets.
- Increase safety of human-automation interaction by incorporating human performance considerations throughout the design lifecycle in NextGen technologies.
- Development of verifiable prognostic algorithms to help remove obstacles to certification.

Recent Research Accomplishments:

- LaRC-led teams have: (1) applied a new approach for discovering potential safety issues to a particular NextGen procedure; (2) participated in revising the guidelines used in developing software for aviation systems; (3) enumerated questions that should be asked when assessing the confidence that may be legitimately placed in the safety of a software-intensive system; (4) developed modeling techniques to verify the accuracy of numerically oriented software; (5) developed analysis tools and techniques to preserve and improve integrity as software evolves over time; and (6) created a database capability to support software analysis and verification activities.

LaRC Facilities and Capabilities Used in Research:

Airborne Subscale Transport Aircraft Research (AirSTAR) Unmanned Aerial System (UAS)
Systems and Airframe Failure Emulation and Testing Integration (SAFETI) Lab
Operator Characterization & Performation Investigations (OCAPI) Lab



LaRC researchers are working to increase the safety of human-automation interaction by incorporating human performance considerations throughout the design lifecycle in NextGen technologies.

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For more information about NASA LaRC aeronautics research, visit http://aero.larc.nasa.gov/